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| 10/696,505 | 10/30/2003 | Yasuo Takebe | 61352-046 | 5764 |

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| EXAMINER | |
|---|---|
| ALEJANDRO, RAYMOND | |
| ART UNIT | PAPER NUMBER |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/696,505 | TAKEBE ET AL. | |
| | Examiner | Art Unit | |
| | Raymond Alejandro | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *02/26/08 & 05/02/08*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-79 and 82-109* is/are pending in the application.

4a) Of the above claim(s) *1-79,82-106,108 and 109* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *107* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 02/26/08 and 05/02/08 have been entered.

This correspondence is in reply to applicant's communication of 05/02/08 and the amendment accompanying the foregoing RCE. The rejection of claim 107 under section 103 based upon Fuller et al and the JP'314 has been satisfactorily overcome. The other two remaining obviousness rejections as postulated below have not been overcome yet. Refer to the abovementioned amendment for details concerning applicant's rebuttal arguments and remarks. Accordingly, the present claims are again rejected over the same art (claim 107) as postulated infra on the written record:

### *Election/Restrictions and Claim Disposition*

1. Applicant's election of Species 1 (claim 107) in the reply filed on 05/02/08 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 108-109 have been withdrawn from further consideration as a result of this applicant's election.

3. Claims 1-79, 82-106 and now 108-109 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 08/21/06.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 107 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 107 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: (*as best understood by the Examiner*) claim 107, as amended, recites the following limitations which appear to be inconsistent with one another in terms of how they are performed, for instances: "*operation the fuel cell while feeding the oxygen-containing gas to the cathode, and feeding a hydrocarbon gas that is a city gas desulfurized with a desulfurizer, a propane gas or a butane gas to the cathode instead of the oxygen-containing gas which has been fed to the cathode*". It is increasingly unclear to the Examiner how this operation is carried out because, on one hand, the oxygen-containing gas is fed to the cathode, and on the other hand, at the same time (as implied by the limitation "***and***") hydrocarbon gas is fed to the cathode instead of the oxygen-containing gas. Simultaneously, the step requires to feed

an oxygen-containing gas while the same step does not require to feed oxygen-containing gas. The same step encompasses subject matter which is just opposed to each other or just the opposite of the other. And apparently, applicant seems to be capable of feeding and not feeding oxygen containing gas to the cathode simultaneously. How do you feed oxygen-containing gas to the cathode but does not feed said oxygen-containing gas to the cathode at the same time? It seems to the Examiner that such limitations/steps are totally inconsistent, mutually exclusive, and thus, improperly recited. All in all, the Examiner does not understand the recited subject matter of claim 107 as now amended. As best understood by the Examiner, during operation (as implied by the limitation "*operating the fuel cell*"), the oxygen-containing gas is **either** fed or not fed to the cathode but it would be impossible to feed and to not feed said oxygen-containing gas at the same time as implied by the limitation "***and***". An analogy to this issue would be that it is not possible to switch off and switch on a light (the same light) at the same time. That is to say, the light is either turned on **or** off but it cannot be off and on at the same time. If applicant believes the foregoing condition is possible as intended by the claimed method for operating the fuel cell, applicant is encouraged to provide a suitable technical explanation and/or objective or sound evidence for evaluation and examination and rebuttal of this issue raised by the Examiner.

*To the extent the present claim was understood by the Examiner (see 112 rejection supra), please note the following art rejection:*

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 107 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al 6068941 in view of Japanese publication JP 2003-229156 (hereinafter referred to as the JP'156).

**Figure 1** illustrates a fuel cell comprising an anode section 10-12, a cathode section 18-20, an electrolyte membrane 8, and flow field plates 2, 2' (Col 2, lines 10-25/Figure 1); and air line 32 for feeding air (Col 2, lines 38-41) and fuel line 24 for feeding fuel (COL 2, lines 30-35).

Fuller et al disclose a method of operating a fuel cell system having a cathode catalyst, and a cathode reactant flow field comprising: upon shut-down of the fuel cell, introducing a low

molecular weight alcohol into the water circulating loop, and at the beginning of a start-up sequence introducing a limited flow of oxidant into said cathode reactant flow field to combust the methanol (CLAIM 5). Fuller et al disclose a proton exchange membrane fuel cell having a methanol or ethanol fed (*hydrocarbon based material*) fed into the coolant passages during shut-down, and that upon start-up, a controlled amount of air is fed through the cathode reactant flow field so that alcohol diffusing to the cathode catalyst is oxidized (ABSTRACT/ COL 1, lines 4-12/ CLAIM 5). *Note that methanol/ethanol are hydrocarbon-based material which are highly volatile. Further note that Fuller et al disclose that alcohol diffuses to the cathode catalyst. Still further note that the alcohol is introduced into the fuel cell upon shutdown thereof. Therefore, there is a presence of such a hydrocarbon-based material in the cathode upon shutdown of the fuel cell, and thus, restoring operation to decrease cathode potential necessarily occurs.*

*Alternatively, Fuller et al also encompass start-up of fuel cell, notice also that start-up takes place after a shutdown operation. Thus, there is also a hydrocarbon-based material in the cathode "after terminating operation of the fuel cell".*

Fuller et al disclose a method of operating a fuel cell system as described above. Nonetheless, the preceding prior art reference fails to expressly disclose supplying the specific gas for replacing oxygen and restoring the cathode.

The JP'156 discloses a fuel cell power generating system and a method of purging a fuel cell comprising purging the fuel cell 10 with reformed city gas at the stopping of the system (ABSTRACT). The JP'156 discloses fuel cell 40 being purged using reformed city gas (ABSTRACT). *It is noted that purging the fuel cell system constitutes replacing fuel cell reactant such as oxygen or oxidant. It is also noted that reforming city gas to form reformed gas*

*city does encompass processing the city gas through multiple gas processing devices including a desulfurizing unit.*

By collecting all the above teachings together, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to supply the specific gas for replacing oxygen and restoring the cathode in the fuel cell system of Fuller et at as taught by the JP'156 because the JP'156 directly teaches that rapid purging, thereby replacement of oxygen, is achieved by using a city gas as it is unnecessary to carry out temperature and moisture control to the city gas.

11. Claim 107 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fuller et al 6068941 in view of Japanese publication JP 11-67252 (hereinafter referred to as the JP'252).

**Figure 1** illustrates a fuel cell comprising an anode section 10-12, a cathode section 18-20, an electrolyte membrane 8, and flow field plates 2, 2' (Col 2, lines 10-25/Figure 1); and air line 32 for feeding air (Col 2, lines 38-41) and fuel line 24 for feeding fuel (COL 2, lines 30-35).

Fuller et al disclose a method of operating a fuel cell system having a cathode catalyst, and a cathode reactant flow field comprising: upon shut-down of the fuel cell, introducing a low molecular weight alcohol into the water circulating loop, and at the beginning of a start-up sequence introducing a limited flow of oxidant into said cathode reactant flow field to combust the methanol (CLAIM 5). Fuller et al disclose a proton exchange membrane fuel cell having a methanol or ethanol fed (*hydrocarbon based material*) fed into the coolant passages during shut-down, and that upon start-up, a controlled amount of air is fed through the cathode reactant flow field so that alcohol diffusing to the cathode catalyst is oxidized (ABSTRACT/ COL 1, lines 4-

12/ CLAIM 5). *Note that methanol/ethanol are hydrocarbon-based material which are highly volatile. Further note that Fuller et al disclose that alcohol diffuses to the cathode catalyst. Still further note that the alcohol is introduced into the fuel cell upon shutdown thereof. Therefore, there is a presence of such a hydrocarbon-based material in the cathode upon shutdown of the fuel cell, and thus, restoring operation to decrease cathode potential necessarily occurs.*

*Alternatively, Fuller et al also encompass start-up of fuel cell, notice also that start-up takes place after a shutdown operation. Thus, there is also a hydrocarbon-based material in the cathode "after terminating operation of the fuel cell".*

Fuller et al disclose a method of operating a fuel cell system as described above. Nonetheless, the preceding prior art reference fails to expressly disclose supplying the specific gas for replacing oxygen and restoring the cathode.

The JP'252 divulges the use of city gas being reformed in a reformer 22 wherein part of the combustion exhaust gas from the reformer 22 is supplied to a housing 21 of a fuel cell 20 as a PURGE gas with a purge gas blower 38. Further disclosed therein is that during an emergency stop, the total amount of the flow rate of purge gas and the exhausting flow rate of the residual gas is controlled (ABSTRACT/FIGURES 1-2). *Thus, reformed city gas/combustion exhaust gas is used as a purge gas to purge the fuel cell. It is noted that purging the fuel cell system constitutes replacing fuel cell reactant such as oxygen or oxidant. It is also noted that reforming city gas to form reformed gas city does encompass processing the city gas through multiple gas processing devices including a desulfurizing unit.*

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the pertinent art at the time the invention was made to supply the specific gas for

replacing oxygen and restoring the cathode in the fuel cell system of Fuller et at as taught by the JP'252 because the JP'252 directly teaches that purge gas such as reformed city gas/combustion exhaust gas is fed into the fuel cell housing during an emergency stop to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system.

Additionally, the claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Stated differently, simple substitution of one known, equivalent element for another to obtain predictable results is prima-facie obvious (*i.e. substitution of the fuel cell anode for the fuel cell cathode*). ***KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)***. The claim would have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. Stated differently, use of known technique to improve similar devices or features (methods, or products) in the same way is prima-facie obvious (*i.e. the fuel cell anode vs. the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007). In this case, the teachings of the JP'252 clearly shows using city gas for yielding the beneficial and predictable result of purging the fuel cell anode to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system. Similarly, applying the city gas of the JP'252 to the fuel cell cathode would also yield the beneficial and predictable result of purging it to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system.*

***Response to Arguments***

12. Applicant's arguments, see the 02/26/08 amendment, with respect to the 103 rejection over Fuller et al and the JP'314 have been fully considered and are persuasive. As such, the rejection has been withdrawn.

13. With respect to claims 108-109, there is no need to address applicant's arguments concerning the foregoing claims because they are now deemed to a non-elected invention (see applicant's election dated 05/02/08).

14. Applicant's arguments filed 02/26/08 and 05/02/08 have been fully considered but they are not persuasive.

15. Regarding applicant's arguments concerning the rejection under Section 103 based upon Fuller et al and the JP'156, the examiner largely disagrees with applicant's characterization of the secondary reference JP'156. For instance, the examiner is quoting the only argument advanced by the applicant to contend this rejection "*In addition, JP 2003/229156 also discloses that the city gas is fed to the anode (see, Abstract of JP 2003/229156.*" A thorough examination of the abstract of JP'156 does not reveal what applicant appears to suggest. Clearly, applicant's characterization and contention is NOT recited in that abstract as alleged and put forth on record by the applicant. Or put differently, the examiner does not see what the applicant appears to be seeing. The true is that the JP'156 abstract discloses the following, inter alia: "*...the gas pushed from the fuel cell 40 by the city gas is introduced into the combustor 48 and burned and exhausted...Since the reformer 30 and the fuel cell 40 are purged using the city gas which is used for reforming material as a purging gas, it is not necessary to prepare a gas for exclusive use for purging*". All in all, the JP'156 suggests using the city gas for purging the ***entire*** fuel cell

which certainly includes not only the anode but also the cathode of the fuel cell. There is nothing else in that abstract to suggest or clearly stipulate that purging only occurs at the anode side as apparently argued by the applicant. Because there is no suggestion in that reference that the anode is the only fuel cell component being purged; and explicitly or implicitly, the reference does not teach not to purge the cathode, there is no evidence or teachings to support that the cathode is not purged, and therefore, that city gas is not fed to the cathode as preferably characterized by the applicant. In short, the Examiner is construing the JP'156 teachings of "*the gas pushed from the fuel cell 40 by the city gas*" and "*the fuel cell 40 are purged using the city gas*" as having all of the conduits or pathways of the fuel cell unit including both anode and cathode conduits/pathways pushed with or purged by the city gas.

16. Regarding applicant's arguments concerning the rejection under Section 103 based upon Fuller et al and the JP'252, it is instructive to review what the secondary reference discloses: "*The JP'252 divulges the use of city gas being reformed in a reformer 22 wherein part of the combustion exhaust gas from the reformer 22 is supplied to a housing 21 of a fuel cell 20 as a PURGE gas with a purge gas blower 38. Further disclosed therein is that during an emergency stop, the total amount of the flow rate of purge gas and the exhausting flow rate of the residual gas is controlled (ABSTRACT/FIGURES 1-2).*" There is no dispute that the city gas in the JP'252 is fed to the anode. The Examiner agrees. But there is also no dispute what is the intended use of the city gas in the JP'252 which is to act as a PURGING gas, and not as a fuel or reactant (like in the JP'314). It is this teaching and only this teaching what prompts the examiner to maintain the above-noted rejection on the ground that if city gas is employed for purging the fuel cell anode, why it (the city gas) cannot be used to purge the fuel cell cathode in a similar fashion in view of

settled law *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)* which supports obviousness rejections based on ***yielding predictable results***.

Thus, the examiner energetically avers that the claim would have been obvious because the substitution of one known element for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention. Stated differently, simple substitution of one known, equivalent element for another to obtain predictable results is prima-facie obvious (*i.e. substitution of the fuel cell anode for the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)*. What's more, the claim would also have been obvious because the technique for improving a particular class of devices was part of the ordinary capabilities of a person of ordinary skill in the art, in view of the teaching of the technique for improvement in other situations. Stated differently, use of known technique to improve similar devices or features (methods, or products) in the same way is prima-facie obvious (*i.e. the fuel cell anode vs. the fuel cell cathode*). *KSR International Co. v. Teleflex Inc., 550 US- 82 USPQ2d 1385, 1396 (2007)*. In this case, the teachings of the JP'252 clearly shows using city gas for yielding the beneficial and predictable result of purging the fuel cell anode to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system. Similarly, applying the city gas of the JP'252 to the fuel cell cathode would also yield the beneficial and predictable result of purging the cathode to regulate efficiency (i.e. temperature profile and operating cost) of the fuel cell system.

It is well to note that the rejection based upon Fuller et al and the JP'314 was withdrawn by the Examiner because in JP'314 propane gas was supplied to the anode as a spare fuel to stabilize power supply, and there would be no reason to also supply propane gas to the cathode to

be used as a spare fuel. Thus, in JP'314 the intended use of the propane gas in the anode side would not be suitable for the cathode side of the fuel cell. However, in JP'252, as explained above, the intended use of the city gas in the anode side (which is a purging gas) would also be suitable for the cathode side of the fuel cell; and the predictable result of purging the fuel cell cathode for regulating efficiency of the fuel cell system would be similarly attained.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/
Primary Examiner, Art Unit 1795